

NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/6 13/13  
NATIONAL DAM SAFETY PROGRAM. UPPER STOKES DAM (NJ00421), DELAWARE--ETC(U)  
FEB 80 R WRUBEL DACW61-79-C-0011

F/6 13/13

NATIONAL DAM SAFETY PROGRAM. UPPER STOKES DAM  
FEB 80 R WRUBEL

DACW61-79-C-0011

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DELAWARE RIVER BASIN  
SHARPS BRANCH OF HAYNES CREEK  
BURLINGTON COUNTY  
NEW JERSEY

**UPPER STOKES DAM**  
**NJ 00421**

**PHASE 1 INSPECTION REPORT**  
**NATIONAL DAM SAFETY PROGRAM**



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**DEPARTMENT OF THE ARMY**

Philadelphia District  
Corps of Engineers  
Philadelphia, Pennsylvania

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**FEBRUARY 1980**

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dams Visual inspection structural analysis National Dam Safety Program Embankments Dam Safety Upper Strokes Dam, N.J.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.		

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PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-N

15 JUL 1980

Honorable Brendan T. Byrne  
Governor of New Jersey  
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Upper Stokes Dam in Burlington County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Upper Stokes Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to three percent of the One Hundred Year Flood would cause the dam to be overtopped. To ensure adequacy of the structure, the following actions, as a minimum, are recommended.

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within one year from the date of approval of this report. Within six months of the consultant's findings, remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. The spring area downstream of the right abutment, and the backslope in that area, should be monitored regularly for signs of seepage and/or a change in conditions.

c. The owner should develop an emergency action plan and downstream warning system within six months from the date of approval of this report.

d. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

NAPEN-N

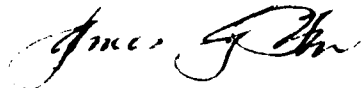
Honorable Brendan T. Byrne

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Forsythe of the Sixth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



JAMES G. TON  
Colonel, Corps of Engineers  
District Engineer

1 Incl  
As stated

Copies furnished:  
Mr. Dirk C. Hofman, P.E., Deputy Director  
Division of Water Resources  
N.J. Dept. of Environmental Protection  
P.O. Box CN029  
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief  
Bureau of Flood Plain Regulation  
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P.O. Box CN029  
Trenton, NJ 08625

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UPPER STOKES DAM (NJ00421)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 12 November 1979 by Louis Berger and Associates, Inc. under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Upper Stokes Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to three percent of the One Hundred Year Flood would cause the dam to be overtopped. To ensure adequacy of the structure, the following actions, as a minimum, are recommended.

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within one year from the date of approval of this report. Within six months of the consultant's findings, remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. The spring area downstream of the right abutment, and the backslope in that area, should be monitored regularly for signs of seepage and/or a change in conditions.

c. The owner should develop an emergency action plan and downstream warning system within six months from the date of approval of this report.

d. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

APPROVED:

James G. Ton  
JAMES G. TON

Colonel, Corps of Engineers  
District Engineer

DATE:

14 July 1980

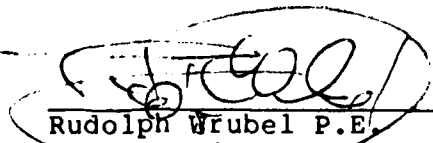
PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

Name of Dam: Upper Stokes Dam Fed ID# NJ 00421  
County Located Burlington  
Coordinates Lat. 3950.7 - Long. 7447.8  
Date of Inspection 12 November 1979  
Stream Unnamed Tributary of Haynes Creek

ASSESSMENT OF  
GENERAL CONDITIONS

Upper Stokes Dam is assessed to be in a fair overall structural condition and is recommended to be downgraded to a significant hazard category. Overtopping would not appreciably increase the danger of loss of life or property damage downstream. No detrimental findings were uncovered to render a hazardous assessment except the spillway capacity is not consistent with the drainage area requirements. However, on the basis of present downstream conditions, improvement is not warranted.

This dam has an inadequate spillway capacity, being able to accommodate only 2% of the design flood. Due to the significant hazard category, additional hydraulic studies are required to more accurately determine the spillway capacity.

  
\_\_\_\_\_  
Rudolph Wrubel P.E.  
Vice President  
Louis Berger & Associates, Inc.





OVERVIEW OF UPPER STOKES DAM

November, 1979

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## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
NAME OF DAM: UPPER STOKES DAM FED ID# NJ 00421

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with Contract FPM-36 between Louis Berger & Associates, Inc. and the State of New Jersey and its Department of Environmental Protection, Division of Water Resources. The State, in turn, is under agreement with the U S. Army Engineer District, Philadelphia, to have this inspection performed.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of the Upper Stokes Dam and appurtenant structures, and to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

Upper Stokes Dam is relatively new as a containment for the lake, having performed a similar function for a lower elevation cranberry bog until 1955. It is an earth embankment 250 feet long with a concrete box spillway about 100 feet from the right abutment. Side slopes are roughly 2H:1V and in general are thickly covered with trees and brush. The spillway contains a timber gate having manually removeable flashboards and has a total length of 4 feet. It discharges through a 36 inch concrete pipe into Mutch Lake which is immediately downstream. A smaller auxiliary concrete box inlet at the left abutment drains through a 12 inch diameter pipe. Water was flowing freely about 2 inches over the boards of the main spillway at the time of inspection and the auxiliary was inactive.

b. Location

Upper Stokes Dam is west of Stokes Road, Route 541, about 1.5 miles south of its intersection with Tabernacle Road on Route 532 in the Borough of Medford Lakes, New Jersey. The dam is one of an almost continuous series of ten or more structures forming lakes of varying size built along Sharps Branch of Haynes Creek and several of its unnamed headwater tributaries.

c. Size Classification

The maximum height of the dam is 11 feet and the maximum storage is estimated to be 68 acre-feet. Therefore the dam is placed in the small size category as defined by the Recommended Guidelines for Safety Inspection of Dams (storage less than 1,000 acre-feet and height less than 40 feet).

d. Hazard Classification

In the event of a failure, some effects might be felt at the culvert at Stokes Road, several hundred feet downstream, and at one or more of the small downstream dams. The few homes in the vicinity of the dam itself might also suffer minor flooding as they are at the edge of the maximum flood plains. Given the capacity of the dam and the amount of natural territory for three quarters of a mile downstream, potential damage should be minor. Based on the Corps of Engineers criteria the classification is therefore recommended to be downgraded to significant hazard.

e. Ownership

The dam is owned by Mr. William Stokes, RFD 1, Medford Lakes, who resides on the property in which it is situated.

f. Purpose of Dam

The dam impounds a private recreation lake.

g. Design and Construction History

As noted earlier, the dam formerly served to provide seasonal flooding of a cranberry bog and nothing is known of its original construction. There are no records at the Division of Water Resources regarding dam application, or the legal owner at the time of construction. It appears the

rebuilding of the earlier cranberry bog dike may have been accomplished without proper State permit. The dam was originally filed with Dam Application 31-68 in 1937 but judging from the size of trees, portions of the embankment are considerably older. The original side slopes were constructed to 1.5H:1V but have gradually flattened out. The present spillway was reconstructed in 1937 and appears to have not been modified since then. An unpaved woods road originally crossed the dam crest but has long been abandoned.

h. Normal Operating Procedures

The owner attends to necessary maintenance and to emergency operation of the flashboards.

1.3 PERTINENT DATA

a. Drainage Area

Upper Stokes Lake Dam has a drainage area of 1.55 square miles which consists primarily of undeveloped pine barrens woodlands.

b. Total spillway capacity at maximum pool elevation - 57 cfs

c. Elevations (ft above MSL)

Top of dam - 87  
Principal spillway crest - 85 (with flashboards)  
Streambed at centerline of dam - 76

d. Reservoir

Length of maximum pool (top of dam) - 1800 feet

e. Storage (acre-feet)

Top of dam - 68  
Recreation pool - 50

f. Reservoir Surface (acres)

Top of dam - 12  
Recreation pool - 7

g. Dam

Type - Earth with pipe culvert spillway  
Length - 250 feet  
Height - 11 feet  
Top width - 9 feet  
Side slopes - variable (approx. 2H:1V in upper  
zones)  
Zoning - Unknown  
Impervious core - Unknown  
Cutoff - Unknown  
Grout curtain - Unknown

h. Diversion and Regulating Tunnel - None

i. Spillway

Type - Concrete box drop inlet  
Inlet width - 4.0 feet  
Gates - Stop logs to elevation 83 MSL  
D/S Channel - Mutch Lake Reservoir

j. Regulating Outlets - None

## SECTION 2 - ENGINEERING DATA

### 2.1 DESIGN

No design data was available. The dam is situated along an undulating interstream divide characteristic of the central part of Burlington County. It lies within a narrow strip of land covered with recent alluvium. The alluvium is mainly silt and sand, with some clay and a significant amount of organic matter near the surface. Underlying the alluvium, and existing as surficial soil beyond the stream divide is the Kirkwood Sand formation. This soil is a fine micaceous quartz sand with interbedded silty sand layers. Depth to bedrock is greater than 100 feet.

### 2.2 CONSTRUCTION

No information was available.

### 2.3 OPERATION

The function of the earlier dam was modified in 1937 from seasonal flooding of a cranberry bog to year-round impoundment of a recreation lake. It has operated satisfactorily since that time.

### 2.4 EVALUATION

#### a. Availability

In view of the size and hazard classification, it is felt that sufficient engineering data is available even though limited to visual and verbal information.

#### b. Adequacy

The available data is believed to be adequate to conclude the enclosed inspection report.

#### c. Validity

Field observations make the basic design self-evident and all data is accepted without recourse to gathering further information.



## SECTION 3 - VISUAL INSPECTIONS

### 3.1 FINDINGS

#### a. General

Visual inspections were conducted on November 21, and December 27, 1979. The reservoir water level at both times was about 3 inches above the top of the timber intake flashboards of the main spillway and was discharging freely. The auxiliary spillway crest flashboards was above the water surface and not transmitting any flow.

#### b. Dam

The embankment appeared to be relatively stable, although slope crests and angles are partly obscured by a heavy growth of trees and brush. The lake level seems quite constant as defined by natural vegetation along the banks, which indicate no present slope problems. The only traffic along the crest pathway is pedestrian and wildlife. A small spring occurs just below the right abutment but its outlet approximates the natural ground water level and does not appear to indicate seepage from the dam embankment.

#### c. Appurtenant Structures

The concrete spillway inlets and timber gates are all in satisfactory condition and alignment, and appear operable with few if any problems. The timber flashboards are relatively new. An abandoned fish hatchery tank lies below the 18 inch auxiliary outlet.

#### d. Reservoir

Upper Stokes Lake is substantially clear of debris, its shore well defined by natural vegetation and its low slopes and entire surrounding area stabilized by the same natural growth. Upstream are two lower, smaller dams and lakes which feed directly into Upper Stokes Lake. With the exception of a few dwellings, the uplands drainage area is undeveloped.

#### e. Downstream Channel

Discharge is almost directly into Mutch Lake, in a narrow zone of brushy marsh with no clearly

defined, intervening channel. This lake is also surrounded by woodland with only one or two residences near its shores and is bounded by its own dam at Stokes Road. Another small dam controls the discharge into Lake Stockwell, just north of Stokes Road. Except for the possible flooding of Stokes Road, the entire downstream channel flood plain is undeveloped.

## SECTION 4 - OPERATIONAL PROCEDURES

### 4.1 PROCEDURES

Operational procedures were discussed with the owner, Mr. Stokes, who personally handles all maintenance responsibilities.

### 4.2 MAINTENANCE OF DAM

Maintenance, as needed, is undertaken by the owner. None has been required to date except for periodic replacement of the flashboards at both spillways.

### 4.3 MAINTENANCE OF OPERATING FACILITIES

The operating facilities of removeable flashboards are kept in satisfactory working order by Mr. Stokes and are presently clean, sound and easily adjusted. There are no other operating facilities at this dam.

### 4.4 DESCRIPTION OF WARNING SYSTEM IN EFFECT

As with the other lakes of the chain, any warning of marked changes in conditions depends on the fairly informal but effective communications among those responsible. This apparently works reasonably well with the larger lakes below Upper Stokes but less well with those smaller structures upstream. A full-time resident at the site, Mr. Stokes can respond promptly with regard to any sudden changes in this particular lake.

### 4 5 EVALUATION OF OPERATIONAL ADEQUACY

Present procedures and safeguards are deemed to be adequate in view of the record and limited hazards at this site. In view of the limited capacity of the spillways, there is little that can be done to alleviate flood conditions during storms.

## SECTION 5 - HYDRAULIC/HYDROLOGIC

### 5.1 EVALUATION OF FEATURES

#### a. Design Data

In accordance with the criteria in the Recommended Guidelines for Safety Inspection of Dams, it has been determined that the dam at Upper Stokes Lake is small in size and of significant hazard. Accordingly, a 100-year frequency event was selected as the design storm and an inflow hydrograph was calculated using precipitation data from Technical Paper 40 and NOAA Technical Memorandum NWS Hydro-35. Inflow to the reservoir was calculated utilizing the HEC-1 computer program, discharging a peak into the reservoir of 2836 cfs. Routing this through the reservoir reduced the peak to 2659 cfs. The spillway capacity before overtopping of the dam occurs is approximately 57 cfs and is therefore able to accommodate only 2% of the design flood.

#### b. Experience Data

There was no information available (hearsay or otherwise) to the inspection team concerning any historical flooding at this structure. Streamflow records were not available.

#### c. Visual Observations

The analyses indicate that it is possible that the dam could have been overtopped in the past, possibly if spring ice blocks the spillway entrance. However, there is no evidence of recent problems. The lake level was at normal pool at the time of inspection.

#### d. Overtopping Potential

Since the spillway cannot accommodate the design flood, there is a potential for future overtopping. No records or hearsay information was available to indicate whether or not the dam has been overtopped in the past.

#### e. Drawdown Potential

Utilizing the main spillway by removal of all flashboards, it would take approximately 11 hours to dewater the lake.

## SECTION 6 - STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

#### a. Visual Observations

Based on the visual inspection, Upper Stokes Dam is evaluated as being in fair overall structural condition. Spillways and outfall pipes are likewise in satisfactory condition. The downstream slopes may be subject to some seepage but this condition has no present detrimental effect upon the dam.

#### b. Design and Construction Data

Although no design data was available, spillway structures appeared to be satisfactory in design and construction. Given the moderate hydraulic differential between the two lakes no stability problems are evident, and the spillways should require only periodic cleaning.

#### c. Operating Records

There are no written records, but operations (according to Mr. Stokes account) have been trouble-free and little is actually required for upkeep of the dam structure.

#### d. Post Construction Changes

There have been no modifications to the structure as it exists.

#### e. Seismic Stability

Upper Stokes Dam is located in Seismic Zone 1 and experience indicates that dams will have adequate stability under dynamic loading conditions if stable under static loading.

SECTION 7 - ASSESSMENTS/RECOMMENDATIONS/  
PROPOSED REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

Subject to the inherent limitations of the Phase I visual inspection, Upper Stokes Dam is classified as being in fair overall condition although the spillways are incapable of passing the design flood. The embankment is of unknown composition, but except for possible minor seepage near the abutments, is apparently sufficiently impervious to withstand normal hydraulic heads. The existing spillways do not meet the requirements of the Recommended Guidelines for Safety Inspection of Dams, being able to accommodate only 2% of the design flood as calculated by Corps of Engineers criteria. The SDF is calculated to overtop the dam by 3 feet which could seriously erode the embankment.

b. Adequacy of Information

Information obtained for the Phase I inspection is deemed to be adequate for the assessment that is herein presented.

c. Urgency

No urgency is attached to implementing further studies. It is recommended that measures noted below be taken under advisement as part of the regular maintenance program.

d. Necessity for Further Study.

None is recommended apart from the possible inclusion of this dam with the overall hydraulic/hydrologic study relative to performance of the several downstream dams which are of a higher hazard category.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

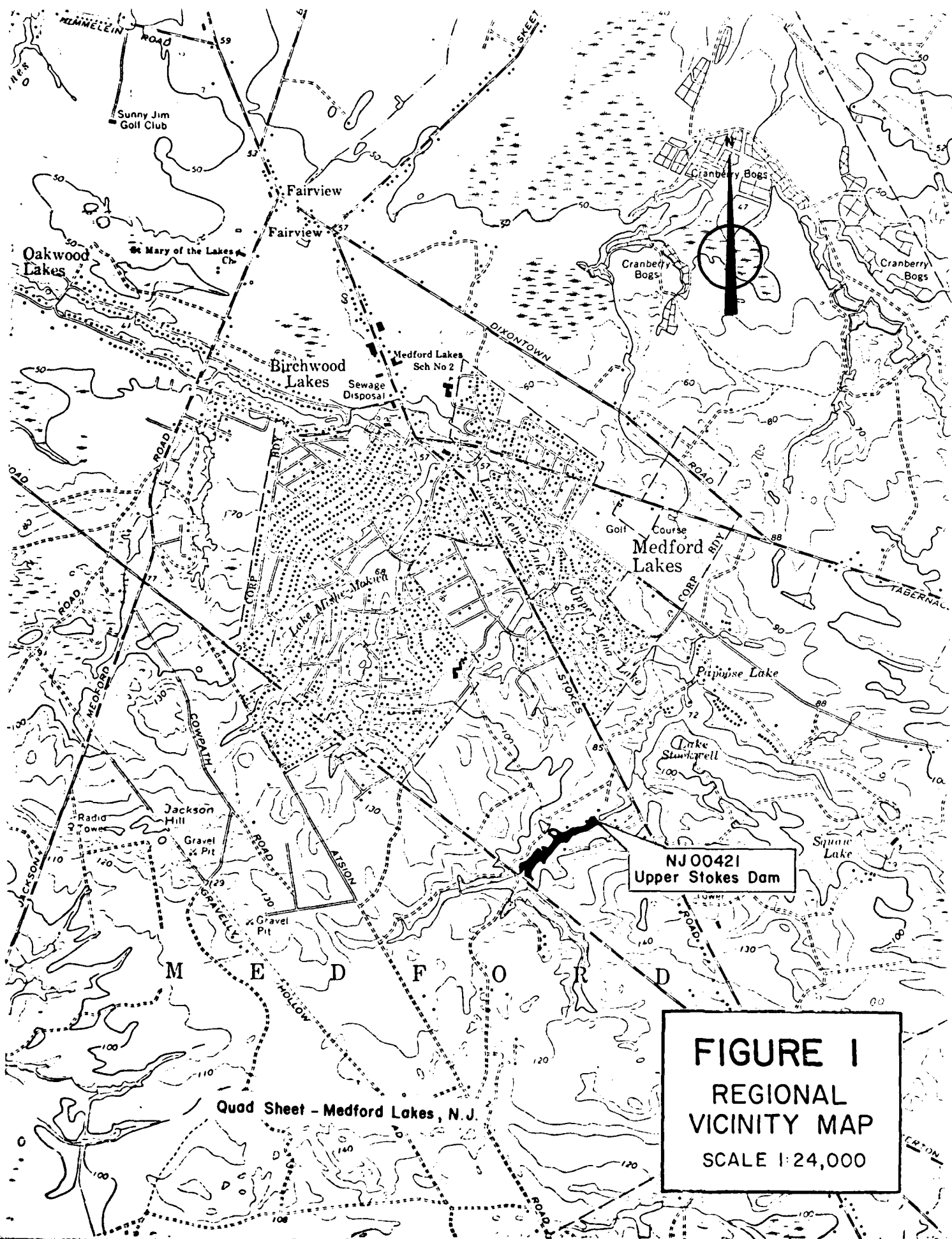
a. Recommendations

On the basis of present conditions, remedial improvements are not warranted. However,

the spring area downstream of the right abutment, and the backslope in that area, should be monitored in the future for signs of seepage and/or a change in conditions. Further in accordance with Corps of Engineers criteria, more detailed hydraulic studies are warranted to be undertaken in the future.

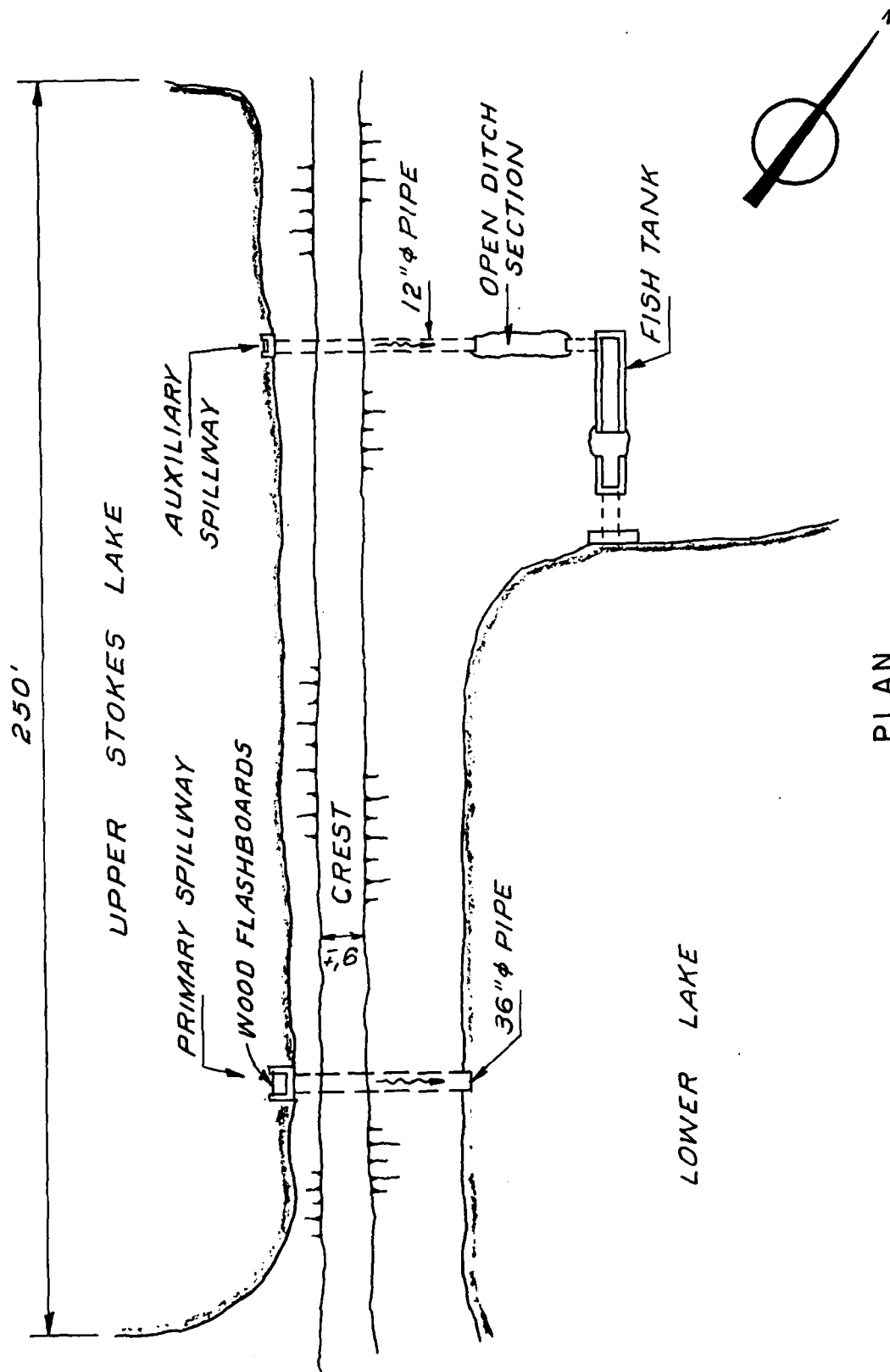
b. O&M Maintenance and Procedures

In the near future the owner should develop written operating procedures and a periodic maintenance plan to insure the safety of the dam.



**FIGURE I**  
**REGIONAL**  
**VICINITY MAP**  
**SCALE 1:24,000**





PLAN  
NOT TO SCALE

FIGURE 2

Check List  
Visual Inspection  
Phase 1

Name Dam Stokes County Burlington State New Jersey Coordinators NJDEP

Date(s) Inspection 11-21-79 Weather Sunny Temperature 70° F  
12/27/79

Pool Elevation at Time of Inspection 85 ± M.S.L. Tailwater at Time of Inspection 79 ± M.S.L.

Inspection Personnel:

L. Baines J. Voorhees  
E. Simone K. Jolls  
D. Lang

D. Lang Recorder

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None seen, many trees, some about 20-24" diameter on u/s and d/s slopes. Heavy brush covering both u/s and d/s slopes	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	spring located at south abutment	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	minor surface erosion-not bad. Primarily downstream-	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	fair, old cranberry bog embankment, age of dam has caused some elevation irregularity	
RIPRAP FAILURES	No rip rap	

OUTLET WORKS		
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	none observed †	
INTAKE STRUCTURE	concrete box w/timber falshboards	
OUTLET STRUCTURE	none observed	
OUTLET CHANNEL	Mutch lake	
EMERGENCY GATE	None, although a secondary small box exists with a 12" ø pipe outlet	inlet crest about 4" above flashboard crest on main spillway.

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EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Good. 9' crest width	
ANY NOTICEABLE SEEPAGE	possible seepage at south d/s may be just spring	
STAFF GAGE AND RECORDER	none	
DRAINS	none	

UNCATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	timber flashboards	
APPROACH CHANNEL	Stokes Lake	
DISCHARGE CHANNEL	Mutch Lake	
BRIDGE AND PIERS	none	

INSTRUMENTATION			REMARKS OR RECOMMENDATIONS
VISUAL EXAMINATION		OBSERVATIONS	
NONUMENTATION/SURVEYS		none	
OBSERVATION WELLS		none	
WEIRS		none	
PIEZOMETERS		none	
OTHER		none	

②

③

RESERVOIR

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

SLOPES

heavily wooded and brushed 3:1 slopes  
rising just about all round.

SEDIMENTATION minor



DOWNSTREAM CHANNEL

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

CONDITION  
(OBSTRUCTIONS,  
DEBRIS, ETC.)

none (open lake)

SLOPES

same as u/s

APPROXIMATE NO.  
OF HOMES AND  
POPULATION

Stokes Road homes: only 2 or 3  
within probable flood high waters.

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	none available
REGIONAL VICINITY MAP	available (U.S.G.S. Quad - Medford Lakes, N.J.)
CONSTRUCTION HISTORY	none available
TYPICAL SECTIONS OF DAM	none available
HYDROLOGIC/HYDRAULIC DATA	none available
OUTLETS - PLAN	none available
- DETAILS	none available
-CONSTRAINTS	none available
-DISCHARGE RATINGS	none available
RAINFALL /RESERVOIR RECORDS	none available

ITEM	REMARKS
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SPILLWAY PLAN

SECTIONS

none available

DETAILS

none available

OPERATING EQUIPMENT  
PLANS & DETAILS

none available

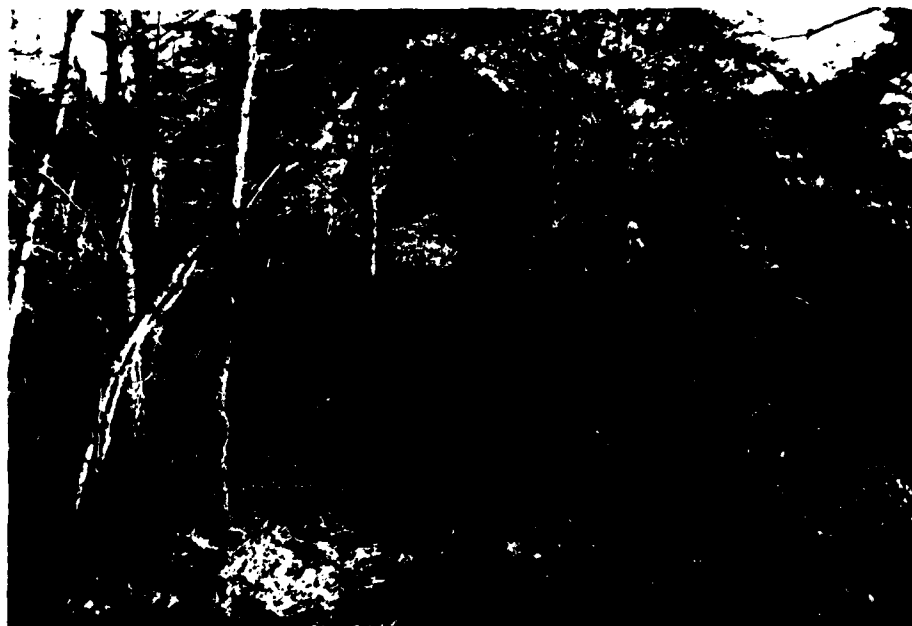
ITEM	REMARKS
DESIGN REPORTS	none available
GEOLOGY REPORTS	none available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	none available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	none available
POST-CONSTRUCTION SURVEYS OF DAM	none available
BORROW SOURCES	unknown

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	None
HIGH POOL RECORDS	not available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	not available
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	unknown
MAINTENANCE OPERATION RECORDS	unknown



Upper Stokes Dam

November, 1979



View of Crest Looking Southeast

November, 1979



November, 1979

View of Spillway Structure



November, 1979

View of Auxiliary Spillway Structure

CHECK LIST  
HYDROLOGIC AND HYDRAULIC DATA  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.55 sq. mi.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): + 85.0 M.S.L. (50 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): \_\_\_\_\_

ELEVATION MAXIMUM DESIGN POOL: + 87.0 M.S.L.

ELEVATION TOP DAM: \_\_\_\_\_

CREST: \_\_\_\_\_

- a. Elevation + 87.0 M.S.L.
- b. Type Earth embankment
- c. Width 9.0 feet
- d. Length 250 feet
- e. Location Spillover none
- f. Number and Type of Gates 2 - concrete inlets

OUTLET WORKS: \_\_\_\_\_

- a. Type concrete drop inlet
- b. Location center of dam
- c. Entrance inverts + 81 M.S.L.
- d. Exit inverts 76 M.S.L.
- e. Emergency draindown facilities none

HYDROMETEOROLOGICAL GAGES: none

- a. Type \_\_\_\_\_
- b. Location \_\_\_\_\_
- c. Records \_\_\_\_\_

MAXIMUM NON-DAMAGING DISCHARGE: 57 cfs



BY L.B. DATE 3-80

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. A1 OF     

CHKD. BY      DATE     

UPPER STOKES DAM

PROJECT 2-246

SUBJECT     

TIME OF CONCENTRATION

CALIFORNIA CULVERTS PRACTICE

LENGTH OF LONGEST WATERCOURSE = 6300 feet = 1.19 mile

$$\Delta H = 110 - 85 = 25 \text{ feet}$$

$$t_c = \left( \frac{11.9 L^2}{H} \right)^{0.385} = \left( \frac{11.9 (1.19)^2}{25} \right)^{0.385}$$

DESIGN OF SMALL  
DAMS 13-71

$$t_c = 0.92 \text{ hr}$$

ALTERNATE METHOD

$$\text{Slope of watercourse} = \frac{10}{2100} = .48 \%$$

$$\text{Assume velocity} = 2 \text{ ft/sec}$$

$$t_c = \frac{2100 \text{ ft}}{2 \text{ ft-sec}^{-1} \times 3600 \text{ sec/hr}} = 0.29 \text{ hr}$$

$$\text{OVERLAND FLOW} \quad \Delta H = 110 - 95 = 15 \text{ feet} \quad \text{Slope} = \frac{15}{4000} = 0.36 \%$$

$$\text{Assume velocity} = 1.5 \text{ ft-sec}^{-1}$$

$$t_c = \frac{4200 \text{ ft}}{1.5 \text{ ft-sec}^{-1} \times 3600 \text{ sec/hr}} = 0.78 \text{ hr}$$

$$t_c = 0.29 + 0.78 = 1.07 \text{ hr}$$

$$\text{USE } t_c = (0.92 + 1.07) / 2 = 0.99$$

BY L.B. DATE 2-80

LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. 12 OF     CHKD. BY      DATE     

UPPER STOKES DAM

PROJECT 2-246SUBJECT     

$$t_p = D/2 + 0.6 t_c = \frac{0.25}{2} + 0.6 (.93) = 0.72 \text{ hr}$$

$$\text{DRAINAGE AREA} = 1.55$$

$$Q_p = \frac{437 (1.55)}{0.72} = \underline{\underline{1042 \text{ CFS}}}$$

UNITGRAPH

<u>TIME</u> <u>(HOURS)</u>	<u>T/T<sub>p</sub></u>	<u>DIMENSIONLESS</u> <u>ORDINATE (D.O.)</u>	<u>Q(CFS)</u> <u>Q<sub>p</sub> x D<sub>o</sub></u>
0.25	0.36	0.216	225
0.50	0.60	0.753	785
0.75	1.04	0.937	1032
1.00	1.33	0.759	791
1.25	1.74	0.454	473
1.50	2.08	0.285	297
1.75	2.43	0.171	178
2.00	2.78	0.101	105
2.25	3.12	0.062	65
2.50	3.47	0.0375	39
2.75	3.82	0.0242	25

$$\Sigma = 4022 \text{ cfs}$$

$$\frac{4022 \times 12 \times 3600}{1.55 \times 5280^2 (4)} = 1.00 \text{ in ok}$$

BY J.C. DATE 12-79

## LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. A3 OF

CHKD. BY DATE

MEDFORD LAKE DAM INSPECTIONPROJECT C 246SUBJECT DEPTH - DURATION RAINFALL DATA FROM TP 40 & HMP 35

100 YR FREQUENCY

TIME	PRECIPITATION	$\Delta$	REARRANGE
0.25	1.7	1.7	0.06
0.50	2.4	0.7	0.06
0.75	2.8	0.4	0.06
1.00	3.1	0.3	0.06
1.25	3.5	0.4	0.07
1.50	3.7	0.2	0.07
1.75	3.86	0.16	0.08
2.00	4.00	0.14	0.09
2.25	4.11	0.11	0.09
2.50	4.22	0.11	0.09
2.75	4.31	0.09	0.11
3.00	4.40	0.09	0.11
3.25	4.49	0.09	0.30
3.50	4.57	0.08	0.70
3.75	4.64	0.07	1.70
4.00	4.71	0.07	0.40
4.25	4.78	0.07	0.40
4.50	4.84	0.06	0.20
4.75	4.90	0.06	0.16
5.00	4.96	0.06	0.14
5.25	5.02	0.06	0.07
5.50	5.08	0.06	0.06
5.75	5.14	0.06	0.06
6.00	5.20	0.06	0.06

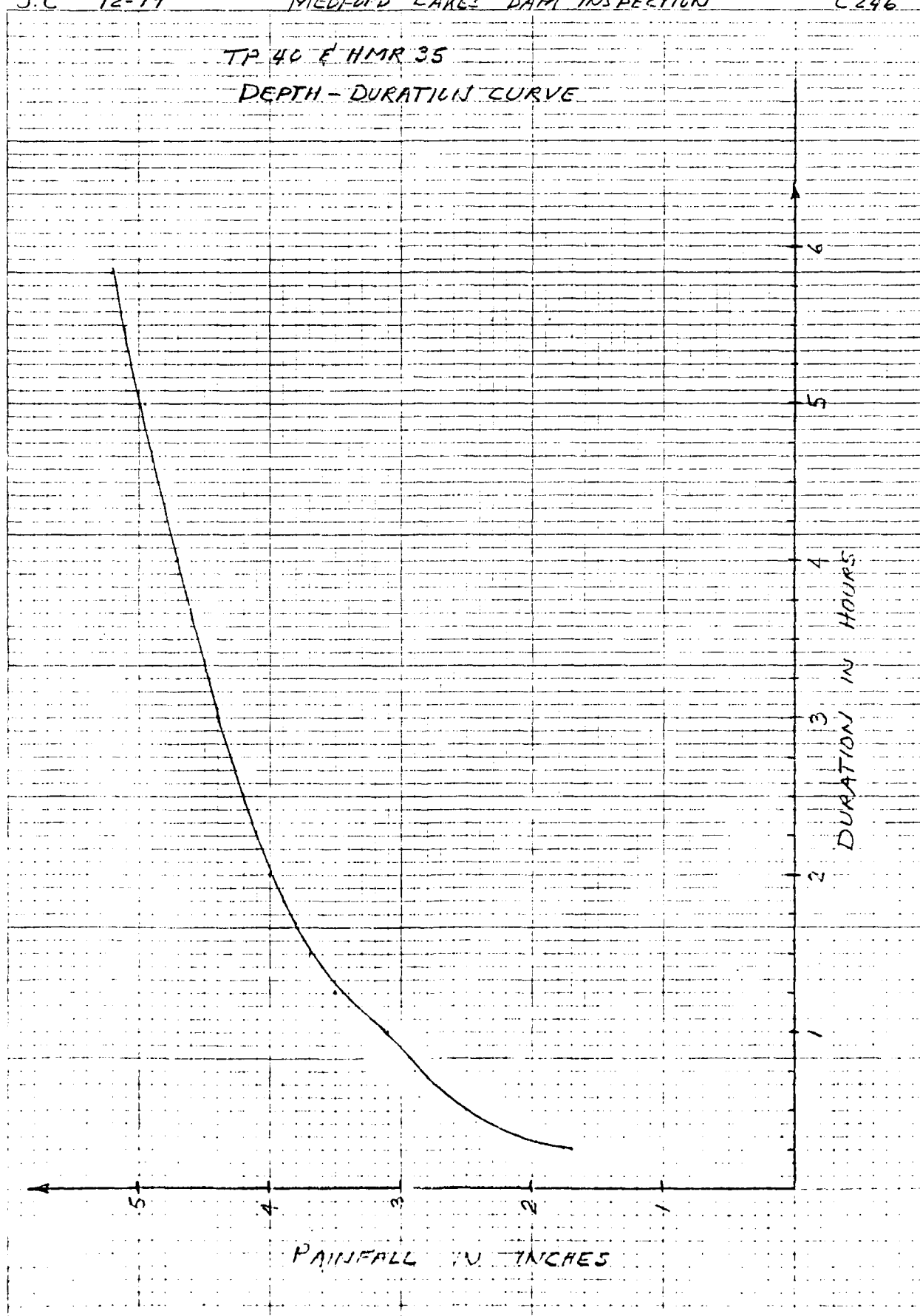
J.C. 12-79

MEDFORD LAKES DAM INSPECTION

C246

TP 40 F HMR 35

DEPTH - DURATION CURVE



46 0706

12 X 10 TO THE INCHES  
SCALE  
RECALL & UNDER 1/4 INCHES

BY L.B. DATE 12-79

CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

SUBJECT DISCHARGE CAPACITY

# LOUIS BERGER & ASSOCIATES INC.

WHITE STONES DAM

SHEET NO. A5 OF \_\_\_\_\_

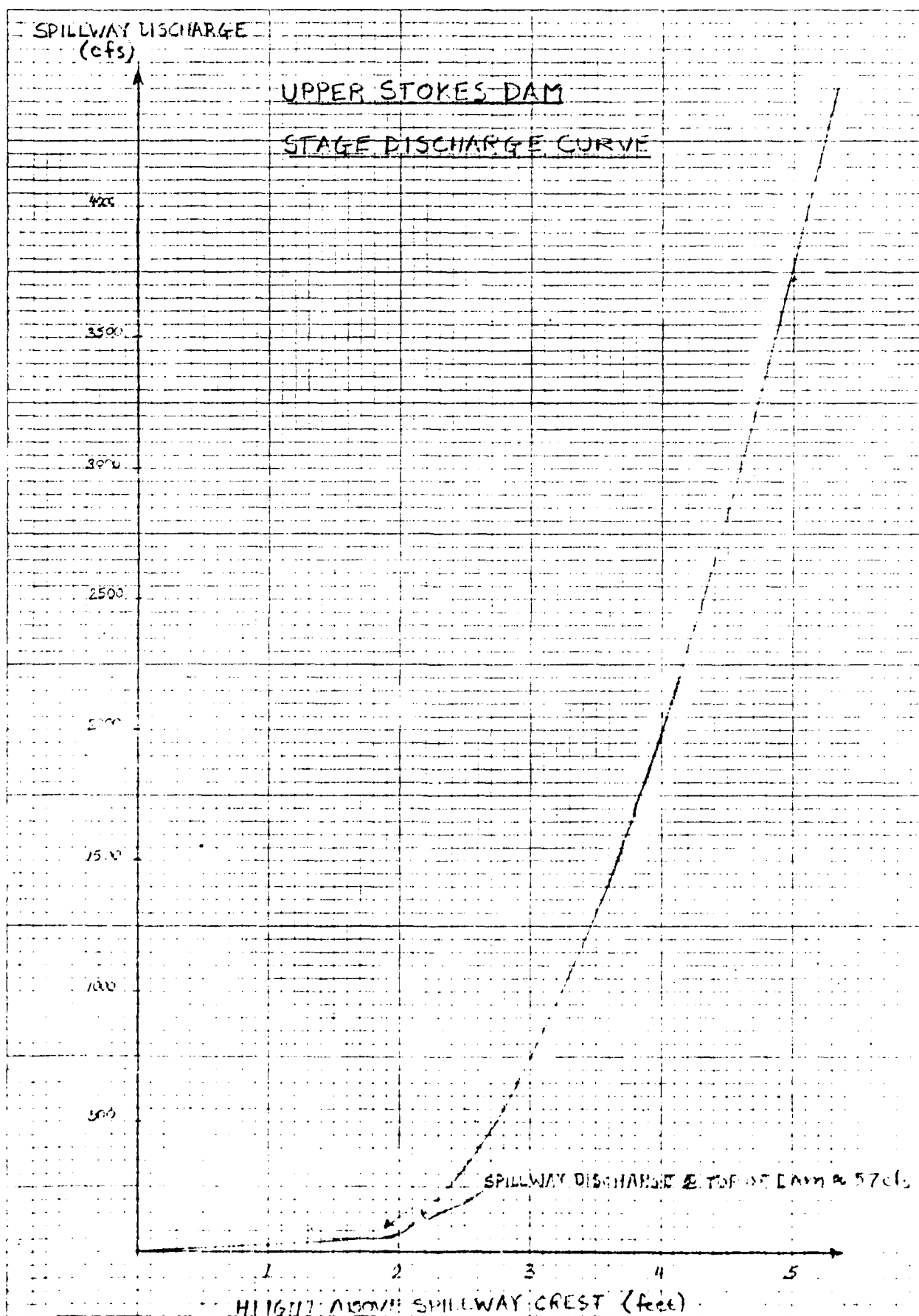
PROJECT 2-2-2

Top of dam

MAIN SPILLWAY			AUXILIARY SPILLWAY			OVER DAM			Σ Q	ELEV
Q = CLH <sup>3/2</sup> L = 3.0'	Q = CATE <sup>3/2</sup> A = 734.2	CONVERT 36" Ø Q = CATE <sup>3/2</sup>	Q = CLH <sup>3/2</sup> L = 15'	Q = CATE <sup>3/2</sup> 12" Ø Q = 15'	Q = 15'	Q = CLH <sup>3/2</sup> L = 250'	H	C		
H	C	Q	H	C	Q	H	C	Q		
0.5	0.33	5	0.17	0.33	0.35	4.5	7		5	85.5
1.0	0.33	13	0.67	0.33	3.0	5	8		16	86.0
1.5	0.33	24	1.17	0.33	6.0	5.5	8		30	86.5
2.0	0.55	42	1.67	0.33	11.0	6	8		57	87
2.5	0.55	54	2.17	0.33	16.0	6.5	9	5	310	87.5
3.0	0.55	60	2.67	0.33	22.0	7	9	1	769	88.0
3.5	0.55	69	3.67	0.30	35.0	8	10	2	2059	89.0
4.0	0.55	77	4.67	0.30	50.0	9	10	3	3724	90.0
4.5	0.55	84	5.67	0.30	67.0	10	11	4	5645	91.0
5.0	0.55	91	6.67	0.30	85.0	11	11	5	7928	92.0
5.5	0.55	97	7.67	0.30	105.0	12	12	6	10537	93.0
6.0	0.55	101	8.67	0.30	126.0	13	12	7	13479	94.0
6.5	0.55	104	9.67	0.30	149.0	14	13	8	15961	95.0
7.0	0.55	107	10.67	0.30	173.0	15	13	9	18927	96.0

DOES NOT  
CONTROL

Assume constant  
to higher EL 81.0



BY L.B. DATE 1/11

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 17 OF

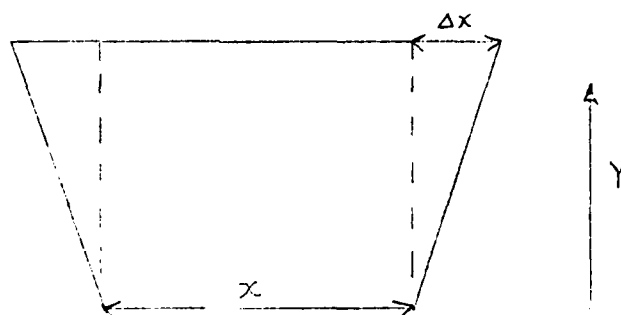
CHKD. BY DATE 1/11

PROJECT 1/11

SUBJECT 1/11

AREA OF BASE = 7 acres @ EL. 85

AREA OF CREST = 18 acres @ EL. 90



$$\text{INCREMENT IN VOLUME } \Delta V = (x + \Delta x) Y$$

Storage in  
acre-feet  
given

Storage  
in  
acre-feet

0

1

2

3

4

5

6

7

8

9

10

8

13

31

46

60

82

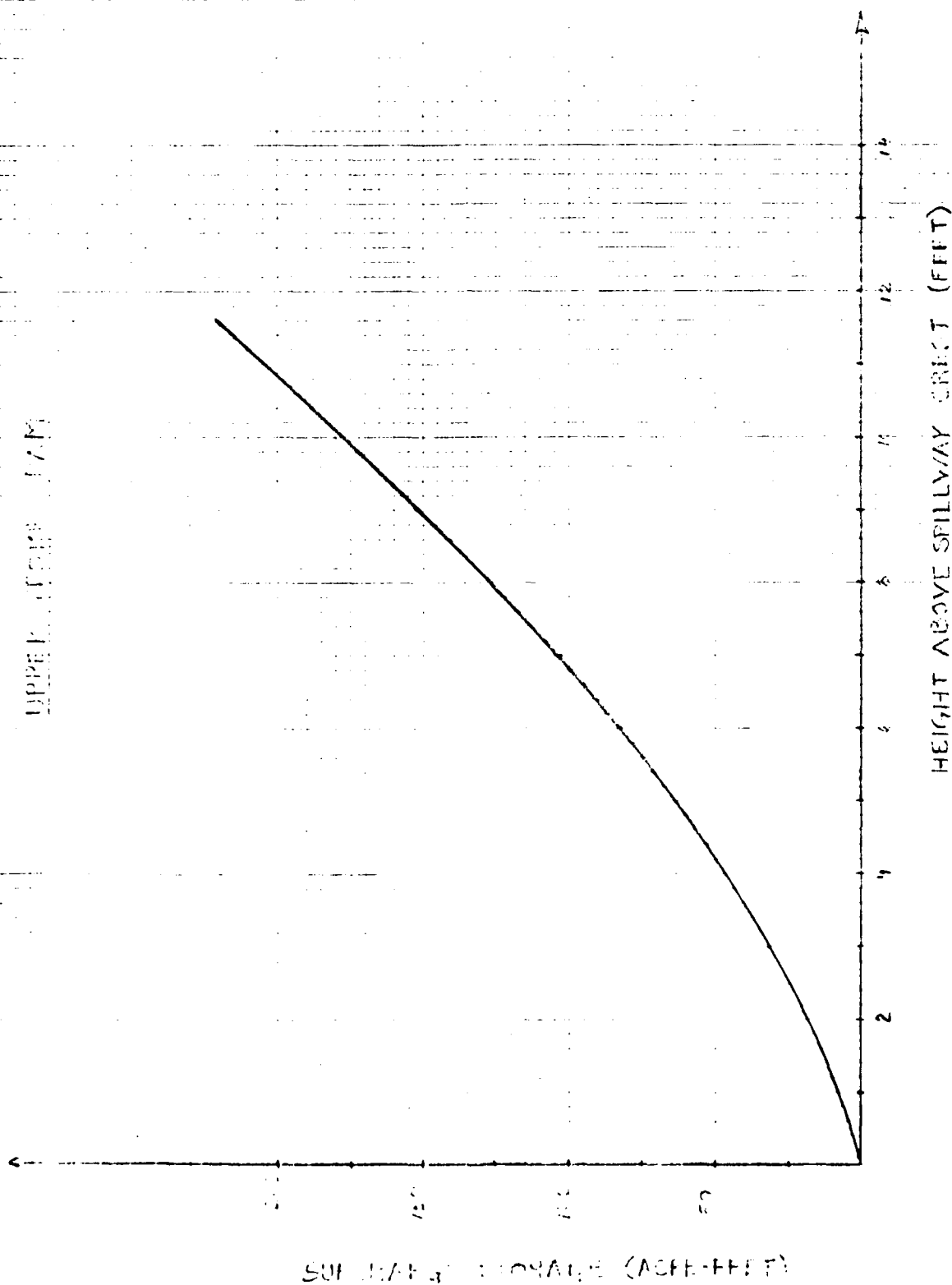
102

125

15

180

STORAGE GIVEN IN  
NEAREST acre-feet





BY L.E. DATE 9-23

# LOUIS BERGER & ASSOCIATES INC.

SHEET NO. A.2 OF

CHKD. BY DATE

UPPER STORES LAIS

PROJECT

SUBJECT DRAINAGE CALCULATIONS

STORAGE AT NORMAL HOOD = 85,000 GALLONS

AVAILABLE HEAD = 9 Feet

ASSUME DRAWDOWN IN TWO STATES WITH BOTH SETS OF FLASHBOARDS REMOVED

ASSUME INFLOW OF 2 CFS AND 10 IN. HOOD

## STAGE 1.

MAIN DRAIN

H = 6.75 feet

$$Q = CA\sqrt{2gH} \quad C = 0.55 \quad A = 7.07 \text{ ft}^2$$

$$= 0.55 (7.07) \sqrt{2(32.2)(6.75)}$$

$$= 81.1 \text{ cfs}$$

BOX END DRAIN

H = 2.52

$$Q = CA\sqrt{2gH} \quad C = 0.55 \quad A = 0.7$$

$$Q = 5.5$$

$$Q_{TOTAL} = 81.1 + 5.5 \times 2 = 84.6 \text{ cfs}$$

$$T_{TIME} = \frac{50 \times 10^3 \text{ GALLONS} \times 2.31 \text{ IN.}}{84.6 \text{ CFS} \times 60 \text{ SEC} \times 12 \text{ IN.}} = 3.6 \text{ HRS}$$

## STAGE 2

MAIN DRAIN

H = 2.25 feet

$$Q = 3.2 (3.4) \sqrt{2(32.2)(2.25)} \quad C = 0.55 \quad A = 0.7$$

$$Q = 41 \text{ cfs}$$

$$T_{TIME} = \frac{50 \times 10^3 \text{ GALLONS}}{41 \text{ CFS} \times 60 \text{ SEC}} = 7.4 \text{ HRS}$$

$$TOTAL TIME = 3.6 + 7.4 = 11 \text{ HOURS}$$

BY L. B. DATE \_\_\_\_\_

## LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO A10 OF \_\_\_\_\_

CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

MEDFORD LAKES DAM INSPECTIONPROJECT C-246SUBJECT UPPER STOKES DAM

\*\*\*\*\*  
 MEDFORD LAKES DAM INSPECTION - STOKES, STOCKVELL, UPPER & LOWER AETNA LAKES  
 BY L. B. BAILES  
 MARCH, 1980

## JOB SPECIFICATION

NO	NHR	NHIN	ICWY	INP	ININ	METRO	IPLY	IPFT	WSTAR
150	0	15	0	0	0	0	0	0	0
JOPEP				NUT					
3				0					

## SUB-AREA RUNOFF COMPUTATION

## INFLOW TO STOKES LAKE

ISTAG	ICOMP	IECON	ITAPE	JFLT	JFRT	INARE
1	0	0	0	0	0	1

## HYDROGRAPH DATA

INVDG	IUND	TAREA	SNAP	TRSDA	TRSEC	RATIO	ISHOW	ISAME	LOCAL
0	-1	1.55	0.00	1.55	0.00	0.000	0	0	0

## PRECIP DATA

HP	STORM	DAJ	DAK
24	0.00	0.00	0.00

## PRECIP PATTERN

0.00	0.06	0.06	0.06	0.07	0.07	0.08	0.09	0.09	0.09
0.11	0.11	0.30	0.70	1.70	0.40	0.40	0.26	0.16	0.14
0.07	0.06	0.06	0.06						

## LOSS DATA

STPLA	ILTR	RTIOL	ERAIN	STEPS	RTION	STRTL	CHSTL	ALSHZ	FTIMP
0.00	0.00	1.00	0.00	0.00	1.00	0.50	0.10	0.00	0.00

GIVEN UNIT GRAPH, MUHQD= .11

225	705	1039	791	475	297	172	105	65	39
25									

UNIT GRAPH TOTALS 4022. CFS OR 1.01 INCHES OVER THE AREA

## RECESSION DATA

STRTQ=	0.00	CRSH=	0.00	RTIOF=	1.00
--------	------	-------	------	--------	------

## END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP
1	0.00	0.00	0
2	0.06	0.00	0
3	0.06	0.00	0
4	0.06	0.00	0
5	0.07	0.00	0
6	0.07	0.00	0
7	0.06	0.00	0
8	0.09	0.04	0
9	0.02	0.02	43.
10	0.09	0.07	103.
11	0.11	0.08	166.

BY L.B. DATE \_\_\_\_\_

## LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. A11 OF \_\_\_\_\_

CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

MEDFORD LAKES DAM INSPECTIONPROJECT C-246SUBJECT UPPER STOKES DAM

12	0	11	0	08	222
13	0	20	0	17	310
14	0	70	0	07	580
15	1	70	1	67	1335
16	0	40	0	38	2404
17	0	40	0	38	2870
18	0	20	0	18	2481
19	0	16	0	13	1914
20	0	14	0	12	1445
21	0	07	0	04	1080
22	0	06	0	03	763
23	0	06	0	03	537
24	0	06	0	03	379
25	0	00	0	00	270
26	0	00	0	00	164
27	0	00	0	00	100
28	0	00	0	00	55
29	0	00	0	00	31
30	0	00	0	00	17
31	0	00	0	00	8
32	0	00	0	00	5
33	0	00	0	00	2
34	0	00	0	00	1
35	0	00	0	00	0
36	0	00	0	00	0
37	0	00	0	00	0
38	0	00	0	00	0
39	0	00	0	00	0
40	0	00	0	00	0
41	0	00	0	00	0
42	0	00	0	00	0
43	0	00	0	00	0
44	0	00	0	00	0
45	0	00	0	00	0
46	0	00	0	00	0
47	0	00	0	00	0
48	0	00	0	00	0
49	0	00	0	00	0
50	0	00	0	00	0
51	0	00	0	00	0
52	0	00	0	00	0
53	0	00	0	00	0
54	0	00	0	00	0
55	0	00	0	00	0
56	0	00	0	00	0
57	0	00	0	00	0
58	0	00	0	00	0
59	0	00	0	00	0
60	0	00	0	00	0
61	0	00	0	00	0
62	0	00	0	00	0
63	0	00	0	00	0
64	0	00	0	00	0
65	0	00	0	00	0
66	0	00	0	00	0
67	0	00	0	00	0
68	0	00	0	00	0
69	0	00	0	00	0
70	0	00	0	00	0
71	0	00	0	00	0
72	0	00	0	00	0
73	0	00	0	00	0
74	0	00	0	00	0
75	0	00	0	00	0
76	0	00	0	00	0
77	0	00	0	00	0

78	0	00	0	00	0
79	0	00	0	00	0
80	0	00	0	00	0
81	0	00	0	00	0
82	0	00	0	00	0
83	0	00	0	00	0
84	0	00	0	00	0
85	0	00	0	00	0
86	0	00	0	00	0
87	0	00	0	00	0
88	0	00	0	00	0
89	0	00	0	00	0
90	0	00	0	00	0
91	0	00	0	00	0
92	0	00	0	00	0
93	0	00	0	00	0
94	0	00	0	00	0
95	0	00	0	00	0
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97	0	00	0	00	0
98	0	00	0	00	0
99	0	00	0	00	0
100	0	00	0	00	0
101	0	00	0	00	0
102	0	00	0	00	0
103	0	00	0	00	0
104	0	00	0	00	0
105	0	00	0	00	0
106	0	00	0	00	0
107	0	00	0	00	0
108	0	00	0	00	0
109	0	00	0	00	0
110	0	00	0	00	0
111	0	00	0	00	0
112	0	00	0	00	0
113	0	00	0	00	0
114	0	00	0	00	0
115	0	00	0	00	0
116	0	00	0	00	0
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118	0	00	0	00	0
119	0	00	0	00	0
120	0	00	0	00	0
121	0	00	0	00	0
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124	0	00	0	00	0
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127	0	00	0	00	0
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133	0	00	0	00	0
134	0	00	0	00	0
135	0	00	0	00	0
136	0	00	0	00	0
137	0	00	0	00	0
138	0	00	0	00	0
139	0	00	0	00	0
140	0	00	0	00	0
141	0	00	0	00	0
142	0	00	0	00	0
143	0	00	0	00	0

SHEET NO. A12 OF       

PROJECT C-246

PROJECT C-246

TIME	EQP	STOR	HYG	IN	EQP	OUT
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	0	0	0	0	0	0
16	0	0	0	0	0	0
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	0	0	0	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
31	0	0	0	0	0	0

BY L.B. DATE \_\_\_\_\_

## LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. 113 OF \_\_\_\_\_

CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

MEDFORD LAKES DAM INSPECTIONPROJECT C-246SUBJECT UPPER STOKES DAM

32	10	6	47	98	1	0	2
33	15	3	44	99	1	0	2
34	14	2	40	100	1	0	2
35	13	0	37	101	1	0	2
36	12	0	34	102	1	0	2
37	12	0	31	103	1	0	1
38	11	0	29	104	1	0	1
39	11	0	26	105	1	0	1
40	10	0	24	106	1	0	1
41	10	0	22	107	1	0	1
42	9	0	21	108	1	0	1
43	9	0	19	109	1	0	1
44	8	0	17	110	1	0	1
45	8	0	16	111	1	0	1
46	8	0	15	112	1	0	1
47	7	0	15	113	0	0	1
48	7	0	14	114	0	0	1
49	7	0	14	115	0	0	1
50	6	0	13	116	0	0	1
51	6	0	12	117	0	0	1
52	6	0	12	118	0	0	1
53	6	0	11	119	0	0	1
54	5	0	11	120	0	0	1
55	5	0	11	121	0	0	1
56	5	0	10	122	0	0	1
57	5	0	10	123	0	0	1
58	5	0	9	124	0	0	1
59	4	0	9	125	0	0	1
60	4	0	9	126	0	0	1
61	4	0	8	127	0	0	1
62	4	0	8	128	0	0	1
63	4	0	8	129	0	0	0
64	4	0	7	130	0	0	0
65	3	0	7	131	0	0	0
66	3	0	7	132	0	0	0
67	3	0	6	133	0	0	0
68	3	0	6	134	0	0	0
69	3	0	6	135	0	0	0
70	3	0	6	136	0	0	0
71	3	0	5	137	0	0	0
72	3	0	5	138	0	0	0
73	3	0	5	139	0	0	0
74	2	0	5	140	0	0	0
75	2	0	5	141	0	0	0
76	2	0	4	142	0	0	0
77	2	0	4	143	0	0	0
78	2	0	4	144	0	0	0
79	2	0	4	145	0	0	0
80	2	0	4	146	0	0	0
81	2	0	4	147	0	0	0
82	2	0	3	148	0	0	0
83	2	0	3	149	0	0	0
84	2	0	3	150	0	0	0
85	2	0	3				
86	1	0	3				
87	1	0	3				
88	1	0	3				
89	1	0	3				
90	1	0	2				
91	1	0	2				
92	1	0	2				
93	1	0	2				
94	1	0	2				
95	1	0	2				
96	1	0	2				
97	1	0	2				

			SUM			17234	
			PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
			2652	693	179	115	17234
			INCHES	4.16	4.30	4.31	4.31
			PC-FT	344	356	356	356

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SUB-AREA RUNOFF COMPUTATION